

CLAIMS

1. A diffusion sheet that diffuses light incident thereon from a light incident side and causes the light to outgo from a light outgoing side, characterized by comprising:

a plurality of approximately trapezoidal columnar unit lens portions disposed such that long-axis directions thereof are in parallel with each other, wherein all surfaces of the unit lens portions, which correspond to long bottom segments of approximately trapezoidal sections of the unit lens portions vertical to the long-axis directions thereof, are disposed on a light-incident-side flat surface; and

a plurality of light absorbing portions interposed between adjacent unit lens portions of the plurality of unit lens portions to absorb external light incident from the light outgoing side,

wherein the plurality of unit lens portions are arranged such that a part of the light incident on the unit lens portions from the light incident side is totally reflected on surfaces of the unit lens portions corresponding to side segments of the approximately trapezoidal sections vertical to the long-axis directions of the unit lens portions, and

a distance between a long bottom segment and a short bottom segment of an approximately trapezoidal section of each of the unit lens portions vertical to the long-axis direction thereof is 120% or more to 400% or less of a length of the long bottom segment.

2. A diffusion sheet according to claim 1, characterized in that a length of a light-outgoing-side bottom segment of a section of each of the light absorbing portions vertical to a long-axis direction thereof is 40% or more to 100% or less of a length of the light-incident-side long bottom segment of the section of each of the unit lens portions vertical to the long-axis direction thereof.

3. A diffusion sheet according to claim 1, characterized in that a section of each of the light absorbing portions vertical to

a long-axis direction thereof interposed between adjacent unit lens portions of the plurality of unit lens portions is formed in an approximately triangular shape, and a vertex of the section on the light incident side thereof is composed of a straight line segment having a width of at least 2 μm .

4. A diffusion sheet according to claim 1, characterized in that a section of each of the light absorbing portions vertical to a long-axis direction thereof interposed between adjacent unit lens portions of the plurality of unit lens portions is formed in an approximately triangular shape, and a vertex of the section on the light incident side thereof is composed of a curved line segment having a radius of curvature of at least 1 μm .

5. A diffusion sheet according to claim 1, characterized by further comprising a support plate disposed on the light outgoing side of the unit lens portions and containing a diffusion agent.

6. A diffusion sheet according to claim 5, characterized in that a light-outgoing-side surface of the support plate is formed flat.

7. A diffusion sheet according to claim 5, characterized in that the support plate has an ultraviolet ray absorbing action.

8. A diffusion sheet according to claim 1, characterized in that the unit lens portions comprise a radiation setting resin.

9. A rear projection screen comprising:
a diffusion sheet according to any one of claims 1 to 8;
and
a Fresnel lens sheet disposed on the light incident side of the diffusion sheet.

10. A diffusion sheet that diffuses light incident thereon from

a light incident side and causes the light to outgo from a light outgoing side, characterized by comprising:

a plurality of approximately trapezoidal columnar unit lens portions disposed such that long-axis directions thereof are in parallel with each other, wherein all surfaces of the unit lens portions, which correspond to long bottom segments of approximately trapezoidal sections of the unit lens portions vertical to the long-axis directions thereof, are disposed on a light-incident-side flat surface; and

a plurality of light absorbing portions interposed between adjacent unit lens portions of the plurality of unit lens portions to absorb external light incident from the light outgoing side,

wherein the plurality of unit lens portions are arranged such that a part of the light incident on the unit lens portions from the light incident side is totally reflected on surfaces of the unit lens portions corresponding to side segments of the approximately trapezoidal sections vertical to the long-axis directions of the unit lens portions, and

a section of each of the unit lens portions vertical to the long-axis direction thereof is formed in an isosceles trapezoidal shape, and the plurality of unit lens portions have at least two types of unit lens portions each having a different angle between each side segment and a light-incident-side long bottom segment of the isosceles trapezoidal section.

11. A diffusion sheet according to claim 10, characterized in that a length of a light-outgoing-side bottom segment of a section of each of the light absorbing portions vertical to a long-axis direction thereof is 40% or more to 100% or less of a length of the light-incident-side long bottom segment of the section of each of the unit lens portions vertical to the long-axis direction thereof.

12. A diffusion sheet according to claim 10, characterized in that a section of each of the light absorbing portions vertical to a long-axis direction thereof interposed between adjacent unit

lens portions of the plurality of unit lens portions is formed in an approximately triangular shape, and a vertex of the section on the light incident side thereof is composed of a straight line segment having a width of at least 2 μm .

13. A diffusion sheet according to claim 10, characterized in that a section of each of the light absorbing portions vertical to a long-axis direction thereof interposed between adjacent unit lens portions of the plurality of unit lens portions is formed in an approximately triangular shape, and a vertex of the section on the light incident side thereof is composed of a curved line segment having a radius of curvature of at least 1 μm .

14. A diffusion sheet according to claim 10, characterized by further comprising a support plate disposed on the light outgoing side of the unit lens portions and containing a diffusion agent.

15. A diffusion sheet according to claim 14, characterized in that a light-outgoing-side surface of the support plate is formed flat.

16. A diffusion sheet according to claim 14, characterized in that the support plate has an ultraviolet ray absorbing action.

17. A diffusion sheet according to claim 10, characterized in that the unit lens portions comprise a radiation setting resin.

18. A rear projection screen comprising:
a diffusion sheet according to any one of claims 10 to 17;
and
a Fresnel lens sheet disposed on the light incident side of the diffusion sheet.

19. A diffusion sheet that diffuses light incident thereon from a light incident side and causes the light to outgo from a light

outgoing side, characterized by comprising:

a plurality of approximately trapezoidal columnar unit lens portions disposed such that long-axis directions thereof are in parallel with each other, wherein all surfaces of the unit lens portions, which correspond to long bottom segments of approximately trapezoidal sections of the unit lens portions vertical to the long-axis directions thereof, are disposed on a light-incident-side flat surface; and

a plurality of light absorbing portions interposed between adjacent unit lens portions of the plurality of unit lens portions to absorb external light incident from the light outgoing side,

wherein the plurality of unit lens portions are arranged such that a part of the light incident on the unit lens portions from the light incident side is totally reflected on surfaces of the unit lens portions corresponding to side segments of the approximately trapezoidal sections vertical to the long-axis directions of the unit lens portions, and

the approximately trapezoidal section of each of the unit lens portions vertical to the long-axis direction thereof has a first angle between one side segment, and a light-incident-side long bottom segment, and a second angle between the other side segment, and the light-incident-side long bottom segment, the first angle being different from the second angle.

20. A diffusion sheet according to claim 19, characterized in that a length of a light-outgoing side bottom segment of a section of each of the light absorbing portions vertical to a long-axis direction thereof is 40% or more to 100% or less of a length of the light-incident-side long bottom segment of the section of each of the unit lens portions vertical to the long-axis direction thereof.

21. A diffusion sheet according to claim 19, characterized in that a section of each of the light absorbing portions vertical to a long-axis direction thereof interposed between adjacent unit lens portions of the plurality of unit lens portions is formed in an

approximately triangular shape, and a vertex of the section on the light incident side thereof is composed of a straight line segment having a width of at least 2 μm .

22. A diffusion sheet according to claim 19, characterized in that a section of each of the light absorbing portions vertical to a long-axis direction thereof interposed between adjacent unit lens portions of the plurality of unit lens portions is formed in an approximately triangular shape, and a vertex of the section on the light incident side thereof is composed of a curved line segment having a radius of curvature of at least 1 μm .

23. A diffusion sheet according to claim 19, characterized by further comprising a support plate disposed on the light outgoing side of the unit lens portions and containing a diffusion agent.

24. A diffusion sheet according to claim 23, characterized in that a light-outgoing-side surface of the support plate is formed flat.

25. A diffusion sheet according to claim 23, characterized in that the support plate has an ultraviolet ray absorbing action.

26. A diffusion sheet according to claim 19, characterized in that the unit lens portions comprise a radiation setting resin.

27. A rear projection screen comprising:
a diffusion sheet according to any one of claims 19 to 26;
and
a Fresnel lens sheet disposed on the light incident side of the diffusion sheet.

28. A diffusion sheet that diffuses light incident thereon from a light incident side and causes the light to outgo from a light outgoing side, characterized by comprising:

a plurality of approximately trapezoidal columnar unit lens portions disposed such that long-axis directions thereof are in parallel with each other, wherein all surfaces of the unit lens portions, which correspond to long bottom segments of approximately trapezoidal sections of the unit lens portions vertical to the long-axis directions thereof, are disposed on a light-incident-side flat surface; and

a plurality of light absorbing portions interposed between adjacent unit lens portions of the plurality of unit lens portions to absorb external light incident from the light outgoing side,

wherein the plurality of unit lens portions are arranged such that a part of the light incident on the unit lens portions from the light incident side is totally reflected on surfaces of the unit lens portions corresponding to side segments of the approximately trapezoidal sections vertical to the long-axis directions of the unit lens portions, and

at least one side segment of the approximately trapezoidal section of each of the unit lens portions vertical to the long-axis direction thereof is composed of a curved line segment projecting inward or a curved line segment projecting outward, and the plurality of side segments of the sections of the plurality of unit lens portions include, as a whole, both the side segments each composed of the curved line segment projecting inward and the side segments each composed of the curved line segment projecting outward.

29. A diffusion sheet according to claim 28, characterized in that: a number of the side segments, which are composed of the curved line segments projecting inward, of the sections of the unit lens portions is approximately the same as a number of the side segments, which are composed of the curved line segments projecting outward, of the sections of the unit lens portions in the diffusion sheet as a whole; a number of the unit lens portions whose right side segments are composed of the curved line segments projecting inward is approximately the same as a number of the unit lens portions whose left side

segments are composed of the curved line segments projecting inward in the diffusion sheet as a whole; and a number of the unit lens portions whose right side segments are composed of the curved line segments projecting outward is approximately the same as a number of the unit lens portions whose left side segments are composed of the curved line segments projecting outward in the diffusion sheet as a whole.

30. A diffusion sheet according to claim 28, characterized in that the unit lens portions each having a section whose side segments are both composed of the curved line segment projecting inward, and the unit lens portions each having a section whose side segments are both composed of the curved line segment projecting outward are disposed alternately.

31. A diffusion sheet according to claim 28, characterized in that one side segment of the approximately trapezoidal section of each of the unit lens portions vertical to the long-axis direction thereof is composed of a curved line segment and the other side segment thereof is composed of a straight line segment.

32. A diffusion sheet according to claim 31, characterized in that: a number of the side segments, which are composed of the curved line segments projecting inward, of the sections of the unit lens portions is approximately the same as a number of the side segments, which are composed of the curved line segments projecting outward, of the sections of the unit lens portions in the diffusion sheet as a whole; a number of the unit lens portions whose right side segments are composed of the curved line segments projecting inward is approximately the same as a number of the unit lens portions whose left side segments are composed of the curved line segments projecting inward in the diffusion sheet as a whole; a number of the unit lens portions whose right side segments are composed of the curved line segments projecting outward is approximately the

same as a number of the unit lens portions whose left side segments are composed of the curved line segments projecting outward in the diffusion sheet as a whole; and a number of the unit lens portions whose right side segments are composed of the straight line segments is approximately the same as a number of the unit lens portions whose left side segments are composed of the straight line segments in the diffusion sheet as a whole.

33. A diffusion sheet according to claim 28, characterized by further comprising a support plate disposed on the light outgoing side of the unit lens portions and containing a diffusion agent.

34. A diffusion sheet according to claim 33, characterized in that a light-outgoing-side surface of the support plate is formed flat.

35. A diffusion sheet according to claim 33, characterized in that the support plate has an ultraviolet ray absorbing action.

36. A diffusion sheet according to claim 28, characterized in that the unit lens portions comprise a radiation setting resin.

37. A rear projection screen comprising:
a diffusion sheet according to any one of claims 28 to 36;
and
a Fresnel lens sheet disposed on the light incident side of the diffusion sheet.

38. A method of manufacturing a mold for a diffusion sheet in which a plurality of approximately trapezoidal columnar unit lens portions are disposed such that long-axis directions thereof are in parallel with each other, and all surfaces of the unit lens portions, which correspond to long bottom segments of approximately trapezoidal sections of the unit lens portions

vertical to the long-axis directions thereof, are disposed on a light-incident-side flat surface, the method characterized by comprising:

a first step of cutting a material of the mold for the diffusion sheet to form a plurality of trapezoidal columnar recesses for unit lens portions with the material remaining spaces for trapezoidal columnar recesses for one or more adjacent unit lens portions on the material; and

a second step of cutting the remaining spaces of the material to form trapezoidal columnar recesses for the adjacent unit lens portions after the completion of the first step.

39. A method of manufacturing a mold for a diffusion sheet in which a plurality of approximately trapezoidal columnar unit lens portions are disposed such that long-axis directions thereof are in parallel with each other, and all surfaces of the unit lens portions, which correspond to long bottom segments of approximately trapezoidal sections of the unit lens portions, are disposed on a light-incident-side flat surface, the method characterized by comprising:

a first step of cutting a material of a master mold for the diffusion sheet to form a plurality of trapezoidal columnar recesses for unit lens portions with the material remaining spaces for trapezoidal columnar recesses for one or more adjacent unit lens portions on the material;

a second step of manufacturing the master mold for the diffusion sheet by cutting the remaining spaces of the material to form trapezoidal columnar recesses for the adjacent unit lens portions after the completion of the first step; and

a third step of obtaining the mold for the diffusion sheet by copying the master mold for the diffusion sheet manufactured at the second step.

40. A method of manufacturing a diffusion sheet characterized by comprising the steps of:

preparing a mold for the diffusion sheet manufactured by

the method according to claim 38;

coating a liquid resin for unit lens portions in the recesses of the mold for the diffusion sheet so that it is buried in the recesses;

setting the liquid resin buried in the recesses of the mold for the diffusion sheet; and

obtaining the diffusion sheet in which a plurality of approximately trapezoidal columnar unit lens portions are disposed, by removing the liquid resin from the mold for the diffusion sheet after it is set.

41. A method of manufacturing a diffusion sheet characterized by comprising the steps of:

preparing a mold for the diffusion sheet manufactured by the method according to claim 39;

coating a liquid resin for unit lens portions in the recesses of the mold for the diffusion sheet so that it is buried in the recesses;

setting the liquid resin buried in the recesses of the mold for the diffusion sheet; and

obtaining the diffusion sheet in which a plurality of approximately trapezoidal columnar unit lens portions are disposed, by removing the liquid resin from the mold for the diffusion sheet after it is set.